

ABSTRACT

A gas, e.g. hydrogen, at relatively low pressure is directly heated by the fission fragments (FF) emitted by a thin layer of fissile material, e.g. ^{242}mAm , deposited on the inner wall of a chamber which is kept cooled at a typical temperature of about 1,000/1,500 K. The gas is preferably emitted as capillary flow from the walls of cylindrical tubes. Its temperature progressively increases until it reaches an equilibrium value of the order of 9,500 K, at which point FF heating and radiative cooling balance. With a relatively modest surface power density at the foil of 200 W/cm², the specific, volume-averaged power given to the H gas may be as large as 0.66 MWatt/g. Heating powers up to megawatts for each gram of gas are therefore feasible with acceptable foil surface heating. The gas heating method can be used in rocket engines for deep space propulsion.